The Ruth H. Hooker Research Library

and Technical Information Center

SELECTION, IMPLEMENTATION AND USE OF UNIX-BASED LIBRARY SYSTEMS IN A CAMPUS NETWORKED ENVIRONMENT

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Abstract:

The Ruth H. Hooker Research Library and Technical Information Center of the Naval Research Laboratory (NRL) has implemented two complementary UNIX-based library systems: Sirsi STILAS (Scientific and Technical Information Library Automation System) and Cuadra STAR. Both reside on a Sun Sparcserver 630/MP connected to the Laboratory's Campus-wide network and the world-wide Internet through a Library Novell LAN. STILAS serves as an integrated library system, supporting the functions of information retrieval, cataloging, circulation, serials control and management information. STAR serves as a database host, providing access to technical report holdings, NRL-authored journal articles and conference papers, and at present one locally-mounted commercial database -- citation histories for NRL-authored publications. Users access these UNIX systems through a single interface, known as the InfoNet; InfoNet menu selections allow users to select the online catalog, reports database, NRL publications database, or citation file as well as a variety of other UNIX and non-UNIX local and remote applications. All resources are searchable both in the Library and from in-office microcomputers, workstations, or terminals throughout the NRL Washington, D.C. campus.

1.0. INTRODUCTION

The Ruth H. Hooker Research Library and Technical Information Center is a scientific research library that serves the researchers and administrators working at the main campus of the Naval Research Laboratory (NRL) in Washington, D.C. NRL was established in 1923 by the Government at the urging of Thomas Edison for a National laboratory to serve the country's defense needs. About 3,500 civilians, half of whom are actively engaged in research, work at the Washington, D.C. site; another 1,200 on-site contractors are also engaged in the research effort. This staff occupies a 130-acre campus of 152 buildings located on the Potomac River in Southwest Washington, D.C. NRL serves as the Navy's corporate laboratory. Research at the Washington, D.C. site concentrates on 17 broad areas: acoustics, advanced space sensing, artificial intelligence, astrophysics, biotechnology, chemistry, condensed matter science, information technology, materials research, optical sciences, plasma physics, radar and electronics, radiation technology, remote sensing, space science, space systems and structural dynamics.

For over 60 years, the Library has served as a focal point for meeting the information needs of the Laboratory. Contributing to the Library's success as an information provider is an excellent research collection of books, journals and reports, selected for relevancy to the NRL mission and interest areas. To provide users with access to these holdings, emphasis has been placed on the creation of tools such as indexes and catalogs, now largely automated. The Library began using OCLC for cataloging in 1970 and by the early 80's had introduced its first fully integrated library system and online catalog for use in the Library. Since 1983, end-users have also been able to search the Library's catalog of book and journal (and more recently software) holdings remotely over the campus

network, known as NICEnet. In 1986, the original system, known as ILS, was replaced by the LS/2000. At about the same time, the database describing the Library's separately maintained research reports collection was placed on line using the Cuadra Star software.

2.0. IDENTIFYING THE NEED FOR A REPLACEMENT SYSTEM

By 1990, it had become evident that a replacement system was needed to provide users with better access to the book, journal and software collection. The existing system provided extremely limited Boolean search capabilities, and these were difficult to use and yielded unsatisfactory results; limiting searches or combining concepts was awkward at best and impossible in some situations. Furthermore, to locate a specific item, search terms often had to be entered exactly as they appeared in the catalog record, something few users could be expected to know. Inconsistencies from screen to screen as to what actions were required served as a constant source of confusion and frustration to both staff and users.

Other problems inherent in the existing system, while perhaps not immediately evident to users, also interfered with the system's cordiality and usefulness. A major drawback was the lack of built-in flexibility for customizing the system. A simple action, such as changing the text message on overdue notices, required the vendor to reprogram the system, with the Library paying the costs associated with this effort. This lack of flexibility was particularly difficult to accept in the area of report generation. For example, it was not possible to generate a shelf list in call number order because of the way call numbers were indexed. To correct this problem would have cost the Library thousands of dollars and significant "down time."

3.0 SPECIFYING THE FUNCTIONALITY OF A REPLACEMENT SYSTEM

3.1 Basic Specifications

With these considerations in mind, the Library began its two-year search for a replacement system that would support all required library functions but provide enhanced capabilities. The system sought needed to provide at a minimum:

- Circulation (tracking of items and patron charges and associated data);
- Cataloging (creation and maintenance of bibliographic records and authority files);
- OCLC interface for cataloging;
- Management Information (report generation);
- System Administration (patron file maintenance, workstation configuration, etc.);
- OPAC (Online Public Access Catalog with full Boolean search capability); and
- Serials Control (check-in, claiming, binding).

An Acquisitions Module was not required as NRL was planning for, and has recently implemented, an online procurement system for use throughout the Laboratory. The Library, which handles book and journal ordering for the entire Washington, D.C. site, opted to use the Lab-wide PIPS (Procurement Information Processing System).

The system sought also had to be user friendly (which basically meant menu-driven), flexible and easy to modify, and capable of interfacing with the campus TCP/IP network. To facilitate the TCP/IP interface, and because UNIX workstations are the choice of a preponderance of the NRL researchers, preference was given to a UNIX-based system.

3.2 Results of User Needs Analysis

In the summer of 1990, the Library, with the help of a consultant, conducted a user needs analysis to develop further specifications for a replacement automated library system[1]. As a result of interviews with 46 individuals representing a cross section of research interests, the Library learned that users first of all wanted to access information resources from their own computers and workstations. They wanted the Library system to:

- Provide subject and author access to journal articles as well as books;
- Allow users to request materials as part of an online search;
- Offer access to multiple databases, both bibliographic and informational;
- Store full text files, such as journal articles or handbooks, for downloading; and
- Provide access to the catalogs of other libraries and to external databases.

3.3 The Library As Information Utility

Library staff gained additional insight into the needs of the user community through participation in a Lab-wide Networking Group, formed to plan for the fiber-optic upgrade to the campus network. As part of its work, the Networking Group addressed the role of the future FDDI network in meeting the informational needs of Laboratory users and identified the Library as a key player. The Library's role as a kind of "information utility" with responsibility for providing the researchers with access to a full spectrum of information resources began to take shape. While individual groups at the Laboratory might continue to provide information services, such as the "NRL Telephone Locator," "Supply Store Inventory," "Procurement Request Status" and "Calendar of Events," the library's role would be to provide the means for users to log into a single front-end or interface to access all available services. It was also envisioned that the Library would provide remote access to multiple "library created" databases as well as databases produced by other libraries, commercial vendors or government agencies.

The Working Group endorsed the concept of a library-provided information utility to:

- Provide researchers with access to local computer systems;
- Act as a gateway to remote systems;
- Integrate these functions with library materials and services; and
- Make all this information available to researchers at their computers or workstations.

3.4 Additional Functionality Requirements

The results of the User Needs Analysis supported by the recommendations of the Network Working Group added the following functional requirements for the replacement system being sought:

- The ability to mount multiple databases on the host computer; and
- A gateway module to provide automatic connections to remote systems or databases.

Although users may want to search many databases and access remote systems, the Library assumed they probably would not be enthusiastic about learning the commands associated with all these systems. To minimize the number of search systems that users would need to learn, the Library added another requirement to its specification list:

- A common command language for searching multiple databases.

With this feature, the user would only need to learn one set of commands to search any database mounted on the host computer or being accessed remotely.

4.0 FEATURES OF THE SELECTED SYSTEM

The system identified that most closely matched the Library's needs was STILAS (Scientific and Technical Information Library Automation System). STILAS is a fully integrated library system developed for the UNIX operating system. Every word in the bibliographic record is indexed and searchable. The system uses the BRS Search Engine to provide full-text retrieval capabilities. Users can therefore search and retrieve information on an item by using any word that appears in its description, title, contents notes or abstract. The system modules include:

Circulation
: allows for charging, discharging and renewing materials, placing items on hold, and interlibrary loan;

Enhanced Public Access

truncation, boolean operators, adjacency and proximity operators can be used, along with hypertext capabilities to find records with the same author, subject, etc.

Bibliographic and Inventory Control
: allows records to be cataloged and maintained (MARC and non-MARC records may be used);

Authority Control
: allows for the establishment of authorized forms for subject headings, personal names, corporate names, conference names and series, all searchable by staff and users through an online thesaurus;

Retrieval Interface Manager
: provides capability to search up to four local or remote databases simultaneously using the STILAS search commands;

Reference Database Manager
: allows the library to mount additional databases and search them with the STILAS commands;

Serials Control
: used to check-in periodicals, display holdings, claim missing issues, route issues, and prepare binding records.

Bibliographic Record Loader
: allows loading of MARC records into the system from several external sources, such as OCLC.

5.0 THE INFONET AS USER INTERFACE AND GATEWAY

In 1990, when the information utility concept was being developed, there appeared to be only three ways in which the Library could implement convenient end-user access to the spectrum of resources requested. One approach would be to run dedicated gateway software on a local computer (Ref. 1); another approach would be to provide users with access to gateway software, such as EASYNET, on a remote computer; and the third approach would be to implement a library system with the desired capability, such as the STILAS Retrieval Interface Manager. However, several diverse developments in information access were taking place in the early 1990's. Taken together, three of these provided the Library with another way to implement the information utility concept.

One applicable development was the in-library networking of CD-ROM databases at installations such as the Nimitz Library at the U.S. Naval Academy (Ref. 2). This work showed it was possible to provide menu access to multiple CD-ROM products and allow multiple users to simultaneously search a single CD-ROM.

Another development was the work going on at many universities to implement Campus-Wide Information Systems (CWIS). Institutions such as MIT, RPI, Dartmouth, Carnegie Mellon and Case Western Reserve were providing students and faculty with access to a wide variety of informational material and databases over their campus networks (Ref. 3-7). Typically the CWIS offered access to course descriptions, class schedules, event calendars, campus publications and often one or more bibliographic databases.

The final enabling development was the rapid expansion of the Internet. Information providers, such as OCLC and DIALOG among others, began to offer Internet access. Not only was there more information available than most people had ever conceived of, now it was possible to quickly and easily get to it.

As the Library continued to search for a system with all the desired functionality, it also began to develop an internal network, called the InfoNet, which would ultimately offer NRL researchers and library staff access to a wide range of internal and external information resources (Ref. 8 and 9). With the implementation of the InfoNet in August 1992, the requirement that the replacement library system serve as a gateway assumed less importance. The InfoNet provides users with access to in-library CD-ROM databases, laboratory management information databases, the library catalog and resources on the Internet. Remote access to STILAS can be accomplished by selecting the Library Catalog category from the InfoNet menu and selecting STILAS from the sub-menu. At some future time, the STILAS gateway capability may be implemented to allow users to take advantage of a single command language for searching such remote systems as Dialog and DTIC (Defense Technical Information Center).

6.0 PROBLEMS ENCOUNTERED DURING STILAS IMPLEMENTATION

No matter how carefully a library plans for implementation of a new system, how many questions it asks and how

closely it follow guidelines, there will always be unexpected complications. NRL's first problem developed early on while configuring workstations that would be used for staff training: STILAS was not programmed to interface with the Library's InfoNet LAN (Local Area Network), which most staff were using for E-mail, CD-ROM searches, searches of the Laboratory's management information files and Internet access. Many of the STILAS function keys could not be made to work on the network since the STILAS function keys for charging and discharging items, displaying item and user information, creating hold queues, etc. do not follow VT series terminal guidelines. Instead, the STILAS system uses keyboard emulation following guidelines proposed by FTP Software, Inc. for its Telnet software. However, whereas the InfoNet makes use of public domain Telnet software, FTP software is a commercial product and also happens to be incompatible with several applications on the InfoNet. The Telnet application of choice on the InfoNet is MS Kermit from Columbia University which defaults to VT series standards for series terminal emulation, but fortunately can be modified to send out any sequence of escape keys for any functional key on the PC keyboard. AR that was required was a listing of the appropriate escape key sequences from Sirsi for STILAS to be made to respond favorably to MS Kermit.

Other problems with networking STILAS include file transfer and printing. Since the STILAS system assumes asynchronous communications links to PCs, i.e. serial hardwired or modem access using STILAS DOS based software, the OPAC was not designed to take advantage of the network connectivity of its UNIX host. Network file transfer and printing are not currently supported by STILAS, even though the SUN host has been configured for both operations. These problems are expected to be addressed in future releases of the STILAS software.

Another problem surfaced in implementing terminals and barcode readers. While the system vendor claimed the brands being used were supported, in reality STILAS did not interface with some of the particular models the Library was using. Configuring the system and connecting hardware would have gone more smoothly if the vendor had specified more exactly the hardware and peripheral devices supported.

Other problems included record errors, which were either created during the conversion process or were transferred over as errors from the previous system. Such problems are not unusual during system conversions; they may range from something as minor as a missing item identifier to as major as valid identifiers attached to the incorrect item.

7.0 CONFIGURATION OF STILAS HOST COMPUTER AND WORKSTATIONS

NRL is a wired facility with its campus network (NICEnet) connected to the Internet. 'Me Library's LAN, the InfoNet, is a host system on NICEnet, permitting users throughout the Laboratory to search in-library resources. STILAS runs on a SUN SPARCStation MP630 connected to both the InfoNet and NICEnet through a Concentrator (hardware designed to pass network traffic through to other systems). SUN configuration allows 32 hardwired lines and numerous networked lines. Currently, the SUN's dedicated lines include 1 console, 4 modems, 1 printer, and 6 lines for staff use. STILAS is configured to accept up to 30 simultaneous users. Sever users are directly connected to the SUN and the remaining 23 access the SUN via modem or the network. While most of the library staff come into STILAS through the InfoNet, the circulation, cataloging and serials control staff are directly connected to the host computer. This hardwired connectivity enables staff to use peripheral devices (barcode readers) to perform functions such as charging, discharging and creating hold queues for items, and creating or editing item information. Six user workstations connect to STILAS via the InfoNet. Two of the six are also connected directly to the host computer to allow an alternate connection should the InfoNet be shut down for emergency maintenance.

8.0 CUADRA STAR SYSTEM AS DATABASE HOST

Just as the implementation of the InfoNet enabled the Library to bypass the use of the STILAS Retrieval Interface Manager, the availability of other system capabilities replaced use of the Reference Database Manager for loading multiple databases.

The NRL Library has a divided collection. The STILAS system supports what is known as the "open literature" collection, that is books, journals, audio tapes, software and other materials that are publicly available. The Library maintains all its research reports, some of which have security classifications of Confidential or Secret, in a separate collection. The research reports number about 375,000 titles; this collection, which is in the process of being scanned to optical disk, has been searchable through the Cuadra STAR system since 1987. This STAR system runs on an AlphaMicro and, because it contains classified information, is searchable only within the

Research Reports areas, which is a secure environment.

In 1990, STAR was ported to a UNIX environment. While continuing to build into its plans possible use of the STILAS Reference Database Manager, the Library decided to implement the UNIX-based STAR software in its open literature area. Using STAR as a second system running on the SUN would simplify the transfer of those report records that were not classified to a second database, which could then be made openly available. The development of the InfoNet provided the end user, both in the Library and from his or her computer or terminal, with menu access to both the STILAS and STAR library catalogs from a single user interface. Use of STAR also offered the Library some economic advantages, since STAR will support multiple databases at no additional cost, while STILAS imposes an additional charge for each database loaded. STAR also offers great flexibility in formatting records, designing search screens, building help capabilities and developing a user interface. The Library has chosen to provide users with access to STAR in a menu-driven mode, paralleling their access to STILAS. Users are of course faced with searching two different systems. However, the complications they encounter are minor compared to the differences they are currently experiencing in searching the various CD-ROM products. NRL users are for the most part extremely computer-literate. Their response to InfoNet with its menu-driven access to dozens of systems with widely varying search engines, indicates that they are able to cope with the diversity.

In addition to the Research Reports Catalog, the databases that are currently running on the SUN under STAR are:

- The NRL Bibliography, a five year listing of NRL-authored journals articles, conference proceedings and reports;
- NRL Citation Histories, a 10-year listing, produced for NRL by the Institute for Scientific Information, of NRL journal articles and number of citations each has received annually;
- NRL Publication and Presentation Releases, a listing of articles and papers cleared for journal publication or presentation at meetings; and
- Periodical Holdings in Ruth H. Hooker Research Library, an online list of periodical titles and holdings in the library collection.

9.0 CONCLUSION

The Ruth H. Hooker Research Library and Technical Information Center has provided its users with the ability to search multiple library catalogs and databases, Laboratory information sources, and Internet resources through a menu-driven user interface. STILAS serves as an integrated library system, supporting the functions of information retrieval, cataloging, circulation, serials control and management information. STAR serves as a database host, providing access to technical report holdings, NRL-authored journal articles and conference papers, and at present one locally-mounted commercial database -- citation histories for NRL-authored publications. Users access these UNIX systems through a single interface, known as the InfoNet; InfoNet menu selections allow users to select the online catalog, reports database, NRL publications database, or citation file as well as a variety of other UNIX and non-UNIX local and remote applications. All resources are searchable both in the Library and from in-office microcomputers, workstations, or terminals throughout the NRL Washington, D.C. campus.

10.0 NOTES

- The User Needs Analysis was conducted by Nancy R. Roderer of Columbia University.

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